Coursera Capstone Project

Predicting the Severity of a Potential Accident

2020-08-31

1. Introduction

This data set is about accident (car collisions) severity. This data includes all types of collisions. Collisions will display at the intersection or mid-block of a segment. The data dates weekly from 2004 to present. The data has been collected from the Seattle Department of Transportation.
All collisions provided by SPD and recorded by Traffic Records.

This includes all types of collisions. Collisions will display at the intersection or mid-block of a segment. Timeframe: 2004 to Present.

For the data analysis I will look into road conditions, light conditions, adress (where the accident took place), weather conditions. For deeper analysis I will use KNN, SVM, LR and Decision Tree algorithms.

1.2. Problem

Data can be used to conclude what influences car accidents. For example, is it road condition, light condition or something else? If it is road condition, maybe it can be solved.

1.3. Interest

Police Departaments, people, World Road Association and others.

2. Data acquisition and cleaning

Most important part of the data analysis is data cleaning and understanding.

Severity of the accidents was segmented mainly into 2 groups:

1) collisions which only involved property damage;

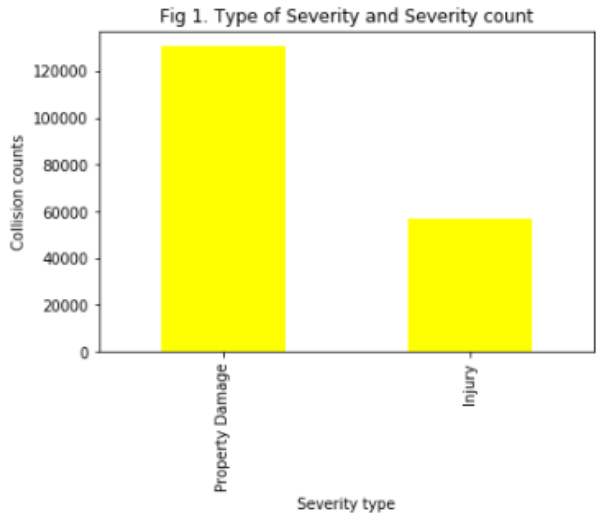
2) collisions which involved injury.

All rows that contained not accurate data, or data, that would not help us, was discarded. For example, values that was named „Unknown“, missing values.

3. Exploratory Data Analysis

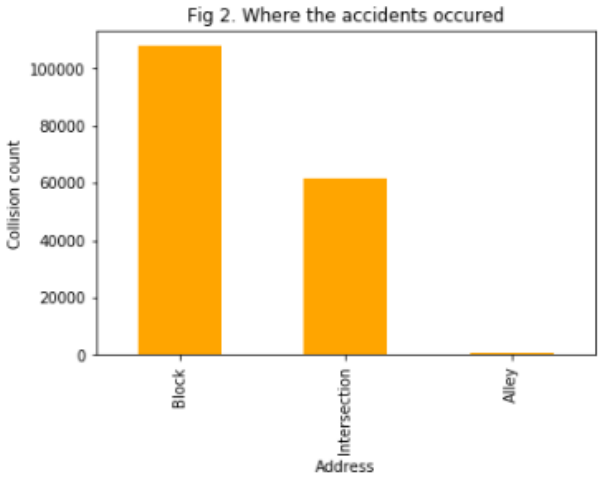
3.1. Relationship between severity types

From the Fig.1 we can clearly see that in most of collision cases property was damaged. Property damage was in 136485 collisions, injuries was in 58188 collisions. That clearly illustrates Fig. 1.



3.2. Relationship between address and collision count

From the Fig.2 we can see that most of the accidents occured in the blocks, less accident occured at the intersections. Least accidents occured at the alley.



- Block 107780
- Intersection 61406
- Alley 595

3.3. Relationship between weather conditions and collision count

From the Fig.3 we can see that most of the accidents occured in the good weather conditions. (Most accidents happened in the 'clear' weather condition.)

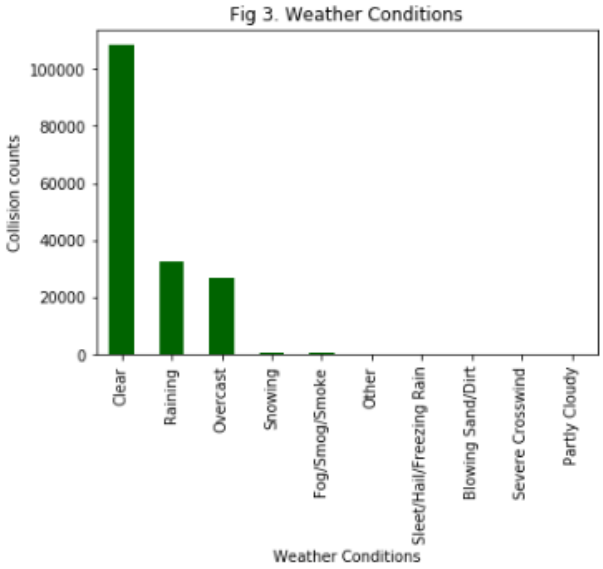
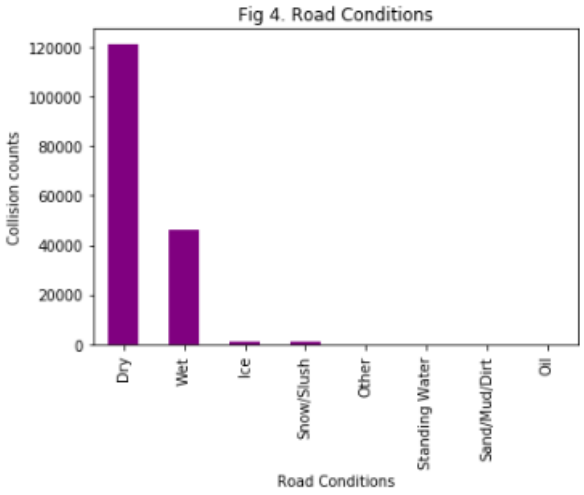


Table 1. Values of accidents in some weather condition

Clear	108507
Raining	32599
Overcast	26863
Snowing	827
Fog/Smog/Smoke	549
Other	253
Sleet/Hail/Freezing Rain	110
Blowing Sand/Dirt	43
Severe Crosswind	25
Partly Cloudy	5

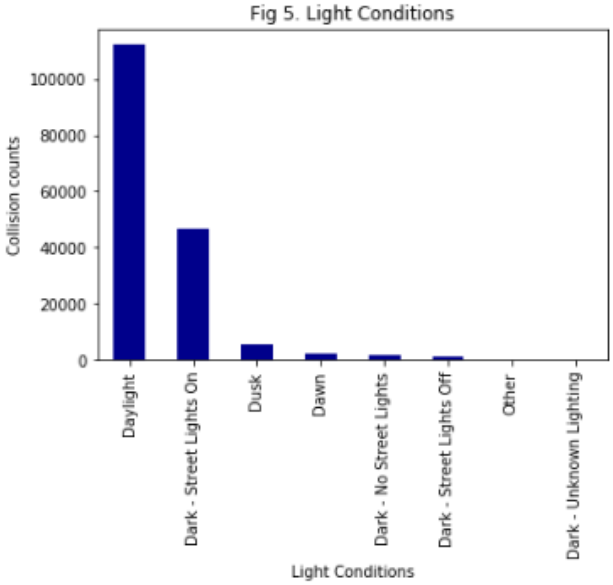
3.4. Road condition influence to accidents

In Fig. 4 we can see that most of collisions happened at the dry road conditions.



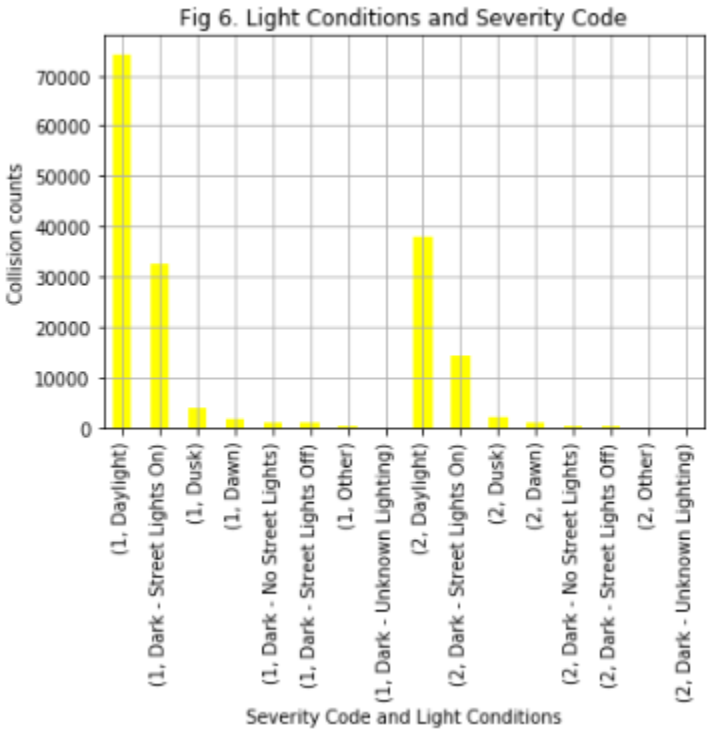
3.5. Light Conditions influence to accidents

From the Fig. 5. we can see that most accidents happened in the daylight. That can happen because of most of the traffic happens also in the daylight. People goes to jobs, schools and so on.



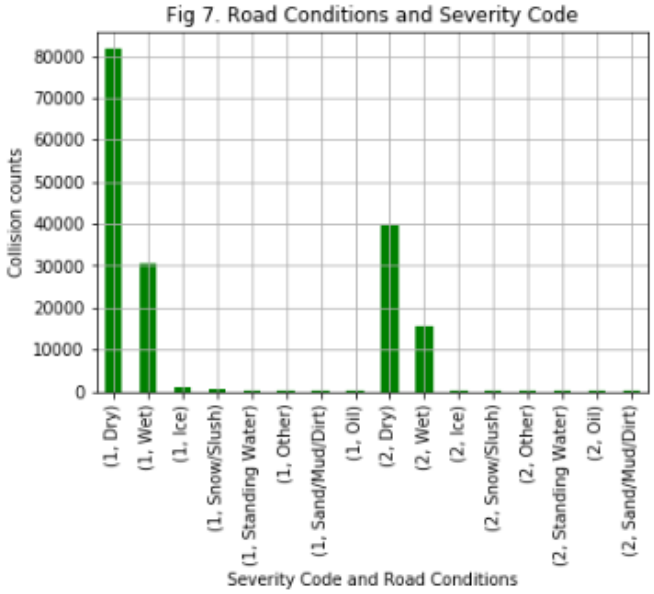
3.6. Light Conditions influence to accidents

Majority of the accidents took place in daylight (property damage and injuries) and in dark (with street lights on). This may conclude that most of accidents happens not because of daytime, but because of that people are unaware of situation, not paying full attention.



3.7. Road Conditions influence to accidents

Most of car accidents where property was damaged or people got injuried, took place in dry road condition.



4. Predictive Modeling

There are two types of models, regression and classification, that can be used to predict player improvement. Regression models can provide additional information on the amount of improvement, while classification models focus on the probabilities a player might improve.

The underlying algorithms are similar between regression and classification models, but different audience might prefer one over the other.

I applied Linear Regression, Support Vector Machine, K –Neariest Number, Decision Tree models.

	Linear Regression	Support Vector Machine	K –Neariest Number	Decision Tree
Train set Accuracy	0.6706	0.6706	0.6439	0.6706
Test set Accuracy	0.6749	0.6749	0.6486	0.6749

5. Conclusion

Most of accidents happened in the daylight, dry road conditions. That concludes that most of accidents happens because of human influence (not paying attention, lack of sleep and so on).

Data was cleaned and prepared for data analysis and model building.

The four models we built are all very similar in terms of prediction and accuracy.

The highest prediction accuracy is about 67.49%.

Most accurate model was "Suppor Vector Machine", "Logistic Regression" and "Decision Tree".

In this project, we have found the major environmental factors and road conditions that affect car accidents. Also we found a building a model that can help predict the severity of car accidents based on these conditions.

Based on the data analysis and results, we can make some recommendations to improve the safety of drivers, pedestrians and others. Most helpful advice would be to pay attention and to watch the signs.